ID de la contribución : **343** Tipo : **no especificado**

LiquidO: A Novel Neutrino Detection Technology

martes, 22 de octubre de 2019 9:10 (20)

Abstract

LiquidO is a new neutrino detection technology which uses opaque liquid scintillator (LS), like milk or paraffin, with a very short scattering length and an intermediate absorption length, contrary to the traditional approach that uses transparent LS volumes, with scattering lengths of up to tens of metres, as neutrino targets surrounded by sensitive sensors that collect light. Reducing the scattering length down to the scale of millimeters causes the light to be confined to a few cm volume near its creation point. To extract the light a lattice of wavelength-shifting fibres runs through the scintillator. The LiquidO technique provides high-resolution imaging that enables highly efficient identification of individual particles event-by-event. Additionally, the explotation of an opaque medium gives LiquidO natural affinity for using dopants at unprecedent levels. A small prototype called "micro-LiquidO" was recently built and tested with a 1MeV monochromatic electron beam, validating the basic principles behind the new paradigm. The main features, R&D status and possible applications will be presented in this talk.

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Clasificación de la sesión : RENATA (Red Nacional Temática de Astropartículas)

Clasificación de temáticas : Red Temática de Astropartículas (RENATA)